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Date: March 17, 2003

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Patent

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Tetsuo TANIGUCHI et al. Serial No.: 09/228,562 Filed: January 12, 1999 Title: INPUT-OUTPUT BALANCED FILTER	Art Unit: 2644 Examiner: C. Tran

SUPPLEMENTAL REQUEST FOR RECONSIDERATION

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Final Office Action dated November 20, 2002, the period for response to which has been extended to March 20, 2003, by the accompanying Petition for a One-month Extension of Time.

Applicants enclose herewith an English translation of Kobayashi (JP 52-50605) to assist the Examiner in completely understanding and evaluating this reference.

In view of the Amendment After Final Rejection filed on February 19, 2003 and the comments above, Applicants respectfully submit that that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

Date: March 17, 2003

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Japanese Unexamined Patent Application Publication No. 52-50605

Fig. 4 is a block diagram in principle of a receiving apparatus of this invention. In Fig. 4, reference numeral 15 denotes an antenna element, reference numeral 16 denotes a mixer, reference numeral 17 denotes an intermediate frequency amplifier, reference numeral 18 denotes a local oscillating frequency amplifier, reference numeral 19 denotes a signal-transmitting cable, reference numeral 20 denotes a limiter amplifier, and reference numeral 21 denotes a television receiver. Fig. 4 differs from Fig. 3 in that an input signal is directly applied to the mixer 16 and that the television receiver 31 is provided with a built-in local oscillating circuit and a built-in antenna circuit unit 22 in the antenna device includes a local-oscillating-frequency amplifier 18 for amplifying a local oscillating signal sent from the receiver 21. In this structure, the antenna device does not have any variable frequency filter at all, and the receiver 21 is provided with the local oscillating circuit, which requires stability, and an output signal therefrom is only amplified by the antenna circuit unit 22. Thus, this structure enables a sufficiently stable operation and facilitates assembly and adjustment of the antenna device. Fig. 5 is a detailed

circuit diagram of the antenna circuit unit 22 in Fig. 4. Terminals A and A' are connection terminals of the antenna element 15, B and B' are intermediate-frequency-signal output terminals. Capacitors C8 to C11 and coils L6 to L10 constitute a high-pass filter for blocking an intermediate frequency component. Schottky diodes D5 to D8 constitute a balanced diode mixer, and makes the degree of balance good by using, in combination, balanced input terminals of a differential intermediate frequency 23 and balance output portions of a differential local oscillating frequency amplifier 24, whereby leakage of the local oscillating frequency to the antenna and the intermediate frequency amplifier is prevented. In particular, when the antenna element 15 is formed by a folding dipole antenna as shown in Fig. 4, it operates to eliminate an identical-phase (unbalanced) signal leaking from the mixer. Thus, it is not necessary to insert an unbalanced-component eliminating circuit such as a balun transformer and also attenuation in input signal can be prevented, which provide convenience. Coils L12 to L14 and capacitors C12 to C14 constitute a demultiplexer that separates a local oscillating component and an intermediate frequency component. L11 is a choke coil and is used to separate, from the high frequency signal component, a DC or commercial-AC-frequency power supply supplied from the terminals B and B'. Diode D9 prevents an

inverse polarity voltage from being applied when the DC power supply is used, while it operates as a rectifying diode when the AC power supply is used. Accordingly, the receiving apparatus can be used using either AC or DC power supply. In addition, since the differential local oscillating frequency amplifier 24 can also have a limiter operation simultaneously with the local oscillating frequency amplifying operation, the circuit is simplified. Also, the structure in Fig. 5 uses only a low-Q fixed-band filter without using a variable frequency selection circuit. This facilitates adjustment and provides good stability. Normally, a direct-mixer receiving apparatus having no high frequency selection circuit has problems such as a noise figure and nonlinear distortion. Nevertheless, by using sufficiently-low-noise-figure diodes as the diodes D5 to D8 in Fig. 5, a total noise figure of 8 dB can be ensured which is practically required in the VHF band also since the antenna circuit unit 22 and the antennal element 15 have therebetween no insertion loss of a selection circuit, no transmission loss, etc. In particular, the total noise figure of the receiving system including the antenna element 15 can be further improved by selecting a large gain of the antenna device. In the receiving system of this type, a combination of the antenna element 15 and the circuit unit 22 enables a design based on a total noise figure.

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Nonlinear distortion tends to be generated because a narrow-band filter is not inserted in the input unit. However, as described above, a combination of a balanced mixer circuit and a folding dipole antenna element reduces emission of a local oscillating frequency component, thus enabling selection of a large input level of the local oscillating frequency signal. Accordingly, a high-level-operating mixer diode can be used in which nonlinear distortion can hardly be generated.

The television receiver 21 in Fig. 4 needs to have a structure for receiving an intermediate frequency which is constant and for sending a predetermined local oscillating frequency to the antenna device. Fig. 6 is a block diagram of a television receiver designed for such an object. In Fig. 6, an antennal input terminal F to which the output terminals B and B' in Fig. 5 are connected is connected to a demultiplexer 25, an output terminal for an intermediate frequency signal component is connected to an intermediate frequency amplifier 26, a separating input terminal for the local oscillating frequency component is connected to a local oscillator 27, and a DC- or commercial power-supply separating input terminal is connected to an insulation transformer T1. When power is supplied as a DC power supply, diode D10 is used. H is a commercial-power-supply input terminal, SW1 is a power-supply switch, VR1 is a variable-

tuning-voltage resistor. Reference numeral 28 denotes a receiver power-supply circuit and a terminal G is an intermediate-frequency-signal-amplifying output terminal. Structure after the terminal G is identical to that after an intermediate-frequency amplifying stage in a common television receiver, such as a detection circuit and video amplifying circuit for use in the common receiver. Accordingly, its illustration is omitted. The structure of the demultiplexer 25 in Fig. 6 is identical to that of the demultiplexing circuit in Fig. 25, and differs concerning other portions from a conventional receiver circuit only in that the high frequency amplifying circuit unit and frequency conversion unit of a tuner are omitted. Therefore, a detailed description is omitted.